Appl. No.: 10/629,397
Amdt. Dated: November 13, 2006
Reply to Office Action of: June 1, 2006

REMARKS/ARGUMENTS

1. Claims

Claims 1-8 are pending in the application. Claims 9-19 were previously withdrawn due to a Restriction Requirement, with applicants reserving their rights to file a divisional application on the non-elected claims 9-19.

Claims 1 and 3-8 have been amended herein.

A. Regarding Claim 1:

Claim 1 has been amended to addition recite that the claim is directed to crystals in which: "said crystal being scatter-free when a red laser beam scatter inspection light is passed through the crystal to detect scatter." This amendment is supported by the specification in Paragraphs [0043] and [0044] as amended by applicants' Office Action Response dated January 7, 2006, Paragraphs [0043] and [0044] as amended are as follows (with the amendment originally made being shown).

> "**[0043]** Figure 9A ~~9C~~ is a color photograph under normal lighting of a calcium fluoride disk blank.
>
> "**[0044]** Figure 9B ~~9D~~ is a color photograph showing a red laser beam scatter inspection light detecting scatter in a calcium fluoride disk blank. In Figure 9D the normal lighting of the calcium fluoride blank of Figure 9C has been turned off. In a scatter-free calcium fluoride crystal disk blank one would not see any red streak in the crystal since there would be nothing to reflect or scatter the light in the middle of the crystal. In a preferred embodiment the method includes transmitting a collimated laser light beam scatter inspection light into a grown calcium fluoride crystal 20 and inspecting the crystal for an observable level of scatter to provide a scatter-free calcium fluoride lens blank with a chlorine concentration less than 0.2 ppm Cl by weight. Preferably scatter-free calcium fluoride crystal 20 has a chlorine concentration $\leq$ 0.2 ppm and a 193 nm transmission > 99%/cm. Preferably scatter-free calcium fluoride crystal 20 has a chlorine content $\leq$ 0.2 ppm and a 157 nm transmission > 97%/cm., preferably > 98%/cm transmission, and preferably > 99%/cm transmission."

Paragraph [0043] refers to Figure 9A which shown the crystal under normal lighting condition. Paragraph [0044] refers Figure 9B and to the crystal with the background light

turned off and a red laser inspections light passing through the crystal. As noted in Paragraph [0044] scatter is detected [by diffusion of the laser beam as it passes through the crystal]. In Paragraph [0044] applicants also state:

> "In a scatter-free calcium fluoride crystal disk blank one would not see any red streak in the crystal since there would be nothing to reflect or scatter the light in the middle of the crystal."

Consequently, in view of the foregoing Paragraphs, applicants submit that the amendment to claim 1 is proper and does not introduce new subject matter into the application.

Further regarding claim 1, applicants submit that above amendment to claim 1 further clarifies what is being claimed.

B. Regarding Claim 6:

Applicants have noticed that claims 5 and 6 are both depend on claim 1 and that both claim the same subject matter. Claim 6 has been amended to depend on claim 2. As a result of this amendment the "duplicate claims" has been removed.

C. Regarding claims 3-8

Claim 3-8 have been amended to recite that the transmission in terms of %/cm

2. § 112 Rejections

The Examiner has rejected claims 3 - 8 under 35 U.S.C. § 112, first paragraph, as being indefinite for failing to particularly point out or distinctly claim the invention. In particular, the Examiner asserts that the claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention.

Applicants have amended the claims complained of by changing" >99%" to ">99%/cm". Applicants have reviewed the priority provisional application and agree with the Examiner that claiming transmission in terms of "% only" was not in the Provisional application. While this is not a barrier to use of the term in the present

application (without priority), applicants believe use of the term"%/cm" is more accurate,, the entry. Applicants believe that this amendment is supported by the specification as filed and does not constitute new subject matter.

THEREFORE, in view of the foregoing amendments, applicants submit that it is proper for the Examiner to withdraw the 35 U.S.C. § 112, first paragraph, rejection of claim 3-8

3. **§ 102 Rejections**

The Examiner has rejected claims 1 – 8 under 35 U.S.C. 102(b) as being anticipated by Sakuma (EP 1 026 548), optionally in view of Bardsley, et al ("Optical scattering in calcium fluoride crystals", A Brit. J. Appl. Phys, 1965, vol. 16, pp 911-912) for reasons set forth in the Office Action. Applicants traverse the rejection.

First, applicants note the EP 1 026 548 is the same as US 6,377,322 cited by the Examiner in previous Office Actions.

Second, an anticipation rejection requires that the claimed invention be clearly present in a single reference. ***As applicants read this rejection is a combination of Sakuma and Bardsley, which is an improper for a 35 U.S.C. 102(b) rejection.*** **HOWEVER**, for argument purposes, applicants assume that the Examiner meant to reject the claims over the Sakuma reference in view of the fact that this reference has been cited numerous times through prosecution of the application. Applicants will also treat Bardsley as a separate 35 U.S.C. 102(b) rejection.

Regarding Bardsley, Bardsley indicates that chloride levels of 50 ppm (see page 911, last paragraph) were fund to produce scatter. There is no indication in Bardsley as to how low one must go to avoid scatter. Going from the 50 ppm level of Bardsley to the 0.3 ppm level taught by applicants is an 80-fold reduction in chloride content (almost 2 orders of magnitude). In addition, Bardsley appears at the dawn of laser of lasers and at that time when lasers did not operate below 200 nm for lithographic purposes. Consequently, there was no way for Bardsley to dctermine what level of chloride would not produce scatter at, 200 nm wavelengths. ***Consequently***, in view of the foregoing

facts and arguments, applicants submit that Bardsley does not anticipate the claimed invention.

Third, Sakuma does not teach scatter-free calcium fluoride single as is taught and claimed by the present invention. In fact, scatter and problems associated with it are not mentioned anywhere in the Sakuma reference. The Examiner's conclusion that the Sakuma crystal be scatter-free and has a low chloride level (see Office Action, page 4, first paragraph) because it has a transmittance of >99.5%/cm is simply an unsupported conclusion because there is no evidence presented in Sakuma concerning these matters.

Paraphrasing Ex Parte Beuther, 71 USPQ2nd, 1313, 1216 [right column, end of third paragraph and paragraph four], (Bd. Pat. App. & Intfer. 2003):

> --In the present case the examiner has not pointed to any teaching in Sakuma or Bardsley, and none is apparent, which relates to calcium fluoride crystals that have a chloride level of <0.3 ppm as claimed in the presents application's.
> --Thus, the examiner's application of Sakuma or Bardsley as an anticipatory reference against the subject matter as recited in claim 1 is unsound--

As a result, the Board of Patent Appeals and Interferences did not sustain the 35 U.S.C 102(b) rejection.

Fourth, applicants submit that even though both Sakuma and the claims of the present application, as amended, recite transmission in terms of "%/cm", the claimed subject matter is not anticipated by Sakuma, the Examiner states that since Sakuma recites a crystal having a transmission of >99.5%, it is presumed that the Sakuma crystal is scatter-free and that it would have a low chlorine level. **This is an invalid assumption in which the Examiner uses applicants' own teaching against them.**

Sakuma is complete silent on the chloride levels of the crucibles used to prepared the crystals described in EP 1 026 548. Imparting a low level of chloride as taught by applicants is adding to Sakuma that which is not present either explicitly or implicitly. Applicants' Figure 16 indicates that a chloride level as low as 0.3 ppm is sufficient to impart scatter to the crystal.

If one uses the highest internal transmittance value given by Sakuma in Table 1, which value is 99.9 % and calculates the internal transmittance for a 20 cm crystal using

the equation Sakuma gives in column 5, line 12, for a crystal losing 0.1% transmittance per centimeter the overall internal transmittance is 98% per 20cm. Applicants submit that the missing 2% is due to scatter losses in the crystal. If a red laser inspection light where passes through the Sakuma crystals this missing 2% would show up as scatter. Sakuma may measure transmittance, but there is indication that the transmitted light is not scattered, If one used an appropriate detector, all the light passing through the crystal could be detected.

In contrast to Sakuma, applicants have clearly indicated that the crystals of the present invention are scatter-free. As applicants have states in Paragraph [0044]

> "In a scatter-free calcium fluoride crystal disk blank one would not see any red streak in the crystal since there would be nothing to reflect or scatter the light in the middle of the crystal."

Throughout their specification and in the Figures applicants have indicated and shown that the crystals of the present invention are scatter-free. Consequently, the 2% loss experienced by the Sakuma crystals would not occur in applicants' crystals and as a result there is no broadening of the inspection beam. The presence of scatter is shown in applicants' Figure 9B.

Fifth, Sakuma indicates that when his polycrystalline calcium fluoride is used to form a calcium fluoride single crystal a scavenger is used. However, the only impurities that Sakuma mentions that are removed from the polycrystalline material are lead, water and oxygen. Further, there is no mention in Sakuma that the crucibles he used have been purified to have a chloride level that is sufficiently low such that the crystal produced using the crucible has a chloride level less and 0.3 ppm. Consequently, while Sakuma teaches removing lead, oxygen and water, *there is no teaching about the removal of chloride, or the prevention of having chloride contaminate of the crystal by diffusion from the crucible preferably by reducing/removing chloride from the crucible prior to making the crystal.*

THEREFORE, in view of the facts and arguments presented above, applicants submit that neither Sakuma not Bardsley anticipates the present invention. Applicants further submit that the claims as amended herein are patentable over Sakuma and

Bardsley. Consequently, applicants submit that it is proper for the Examiner to withdraw the 35 U.S.C. 102(b) of the claims.

4. § 103 Rejections

The Examiner has rejected claims 1 – 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakuma, et al (EP 1 026 548) in view of Hammond, et al (6,093,245) for reasons set forth in the Office Action. Applicants traverse the rejection

First, Applicants believe that the Examiner made an error in the Office Action on page 5, third line from the bottom. Applicants believe that the Examiner is citing Hammond '245 and not Sakuma '548 because Sakuma claim 1 does not mention using a porous crucible. The error continues through the first four lines of page 2 of the Office Action as is evidence by the fact that Sakuma '548 claims 2-4 do not mention graphite, graphite pyrolytic carbon or glassy carbon whereas Hammond '245 does mention these materials. In view of the foregoing, applicants' response is made with the understanding that the Examiner meant Hammond '245 and not Sakuma '548.

Second, applicants note that the Examiner has admitted that Sakuma does not disclose the chlorine concentration in the calcium fluoride crystals of the '548 application.

Third, applicants further note that Hammond '245 teaches in column 3, lines 37-39, that:

> "The crucible is then purified by a known high temperature chlorine process before the coating is applied."

Fourth, Hammond '245 describes a process for sealing the pores of a crucible in order to prevent molten metal fluorine from either seeping out of the crucible or seeping into the pores of a crystal in order to prevent the a metal fluoride crystal, after it and the crucible have been cooled, from adhering to the crucible (see column 3, lines 20-27). Hammond defines what he means by the terms "pyrolytic carbon" and "glassy Carbon" in the specification in column 3, lines 12-16.

Hammond '245 does not mention diffusion of any materials in the crucible through the coating into the molten metal fluoride. However, since the crucibles of

Hammond have been purified using a chlorine process, residual chlorine is present in the crucible after purification. As a result there is chlorine present in the crucibles that can diffuse through the coating during the coating process and/or during the process of making the metal fluoride crystal. Diffusion during the coating process would be particularly disadvantageous to making calcium fluoride crystals for <200 nm application because chloride in the coating could be indirect contact with the molten metal fluoride.

Typically the manufacturers of the glass carbon crucibles report only metallic impurities. Attached to this Response are two web pages (Attachments A and B), one from Graphite Die Mold Inc. mentioned in the '254 patent in column 5, Example 6, and the other from Tokai Carbon Co. Ltd. In both instances only metallic impurities are reported. No chloride level is reported, nor is the level of any other anionic impurity reported. Consequently, in view of the fact that Hammond '245 clearly states that the crucible is chlorine purified, applicants submit that the Hammond crucibles retain sufficient chlorine such that even after coating the crucibles can contaminate the metal fluoride crystals grown therein.

THEREFORE, in view of the facts and arguments presented above, applicants submit that the claimed invention is not obvious over the combination of Sakuma and Hammond, and applicants further submit that the claims as amended herein are patentable over Sakuma and Hammond. Consequently, applicants submit that it is proper for the Examiner to withdraw the 35 U.S.C. 103(a) of the claims.

5. Conclusion

Based upon the above amendments, remarks, and papers of records, applicants believe the pending claims of the above-captioned application are in allowable form and patentable over the prior art of record. Applicants respectfully request that a timely Notice of Allowance be issued in this case.

A three (3) month Extension of Time is necessary to make this Reply timely. Applicants respectfully request that the Office grant such time extension pursuant to 37 C.F.R. § 1.136(a), and hereby authorize the Office to charge any necessary fee or

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surcharge with respect to said time extension to the deposit account of the undersigned firm of attorneys, Deposit Account 03-3325.

Please direct any questions or comments to Walter M. Douglas at 607-974-2431.

13 November 2006
Date

CERTIFICATE OF TRANSMISSION UNDER 37 C.F.R. § 1.8

I hereby certify that this paper and any papers referred to herein are being transmitted by facsimile to the U.S. Patent and Trademark Office at 571-273-8300 on:
13 November 2006
Date

Walter M. Douglas 13 Nov 2006
Walter M. Douglas Date

Respectfully submitted,
CORNING INCORPORATED

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ypical Purity Levels

ATTACHMENT A

Appln No 10/629,397
Amdt. Dated November 13, 2006

Typical Purity Levels

Aluminum (Al)	0.200
Barium (Ba)	0.010
Boron (B)	0.200
Calcium (Ca)	0.150
Copper (Cu)	0.020
Chromium (Cr)	0.200
Cobolt (Co)	0.050
Iron (Fe)	0.200
Lead (Pb)	0.010
Lithium (Li)	0.005
Magnesium (Mg)	0.005
Mangenese (Mn)	0.020
Molybdenum (Mo)	0.020
Nickel (Ni)	0.020
Potasium (K)	0.100
Phosphorus (P)	0.100
Sodium (Na)	0.150
Strontium (Sr)	0.015
Thorium (Th)	0.005
Tin (Sn)	0.015
Titanium (Ti)	0.200
Tungsten (W)	0.150
Uranium (U)	0.005
Vanadium (V)	0.050
Zinc (Zn)	0.010
Zirconium (Zr)	0.050
Total	**<3.000**

okai Carbon Co.,Ltd. | Products

ATTACHMENT B
APPLN. NO. 10/629,397
AMDT. DATE: NOVEMBER 13, 2006

TOKAI CARBON CO.,LTD.

Products | Fine Carbon

- Fine Carbon
- Semi Conductor
- High Temperature / Metallugical
- Electrical / Chemical
- Specially Developed

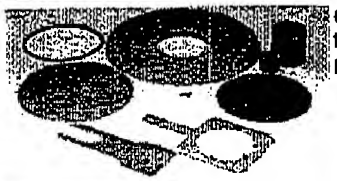
Semi Conductor ▸ Isostatic Graphite ▸ Extruded Graphite ▸ Molded Graphite
SiC Coated Graphite ▸ Glassy Carbon ▸ C/C Composite

Semi Conductor
Glassy Carbon

Contact Us
03-3746-8109
FC-eMAIL@tokaicarbon.co.jp

Glassy Carbon
Forms and Dimensions of Glassy Carbon(unit:mm)

DATA: GLASSY CARBON



Glassy Carbon, which has been developed by our unique technology is a gas impermeable, black glass like carbon product.

FEATURES

- Low Apparent Density
- Excellent Chemical Resistance
- gas Impermeability
- High Purity
- Little Particle Generation
- No Outgassing

APPLICATIONS

- Wafer Holders
- Heat Reflectors
- Susceptors
- Guide Rings
- Gas diffuser Electrodes for Plasma Etching
- Crucibles, Protecting Tubes, etc.

TYPICAL PROPERTIES

Apparent Density	1.51	g/cm^3	
Electrical Resistivity	42	μΩm	
Flexural Strength	147	MPa	(500kgf/cm^2)
Shore Hardness	120	(-)	
Ash	> 2	ppm	
Thermal Conductivity	5.8	W/mK	(5.1kcal/mhr℃)

TYPICAL IMPURITIES ANALYSIS

	Al	Ca	Cr	Cu	Fe	K	Na	Ni	Tl	V
ppm	> 0.08	> 0.04	> 0.07	> 0.08	> 0.04	> 0.1	> 0.05	> 0.1	> 0.09	> 0.07

TOP